# HIGH SPIN ISOMERIC STATES IN $^{197}$Pb

H. RICHEL (*), G. ALBOUY, G. AUGER, J. M. LAGRANGE, M. PAUTRAT, C. ROULET, H. SERGOLLE and J. VANHORENBEECK (*)

Institut de Physique Nucléaire, B.P. 1, 91406 Orsay, France

High spin isomeric states in $^{197}$Pb have been investigated by in-beam gamma ray technics. These states are produced in (heavy ion, $xn$) reactions. The various experiments performed are summarized in table I.

The proposed level scheme is presented in figure 1. As can be seen on the figure, the $^{197}$Pb level scheme looks like those of $^{198}$Pb and $^{196}$Pb if the $13/2^+$ isomeric state is related to the $0^+$ ground state in even lead isotopes. The 55 ns half life is due to a small unobserved E2 transition between the $33/2^+$ and $29/2^+$ states. Low-energy E1 transitions ($21/2^- \rightarrow 21/2^+$; 32 keV and $21/2^- \rightarrow 19/2^+$; 57 keV) account for the 700 ns half-life.

The higher spin states are well reproduced by a quasi-particule calculation (T.D.3 approximation with an S.D.I. interaction; $G_{SDI} = 0.165$ MeV) what favours a pure configuration interpretation, as was observed for the $12^+$ and $10^+$ levels in the even isotopes. The same agreement is not obtained for the lower lying levels, especially $17/2^+$ and $15/2^+$; the position of these states, compared to that of the $2^+$ level suggests that they are members of the multiplet resulting from the weak coupling of a $2^+$ core excitation with an i13/2 quasi-particle.

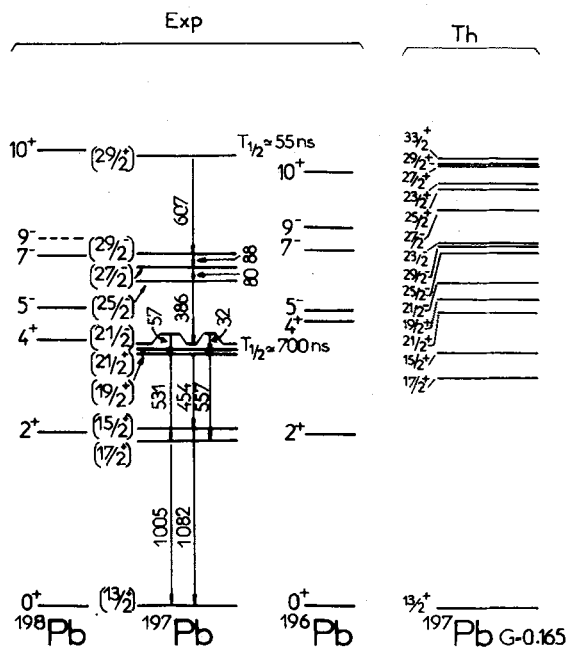


TABLE I

| | Reaction used | Accelerator and laboratory | Beam energy in MeV |
|---|---|---|---|
| Excitation functions | $^{186}$W($^{16}$O, 5n) | Cyclotron-Louvain-la-Neuve-Belgium | 80 to 115 |
| | $^{198}$Hg($\alpha$, 5n) | — | 50 to 75 |
| Half-life measurements | W($^{16}$O, 5n) | Variable energy cyclotron Orsay, France | 97 |
| $\gamma_1$-$\gamma_2$ coincidences | | | |
| $\gamma_1, \gamma_2 \gtrsim 100$ keV | Re($^{14}$N, 4n) | Cyclotron-Louvain-la-Neuve-Belgium | 73 |
| $\gamma_1 \leq 100$ keV, $\gamma_2 \geq 100$ keV | $^{186}$W($^{16}$O, 5n) | Tandem M. P. Orsay-France | 86.5 |

(*) I.I.S.N. Bruxelles, Belgique.